



MRV Tools for Building Energy Policy Action Plans

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Federal Ministry for the
Environment, Nature Conservation
and Nuclear Safety

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SEMANTIC WEB COMPANY
linking data to knowledge

Action Plan Development:

1. Stock Taking

- Existing policies and policy context;
- Transformational, Tools, Technologies & Designs
- Work force skills & capabilities;
- Information, Knowledge and Awareness

2. Scenario analysis & Goal setting

- **MRV Base-line & Mitigation Scenarios**
- Market Data and Assumptions
- Best-Practice Scenarios
- Co-Benefits Analysis

3. Implementation Road-Maps

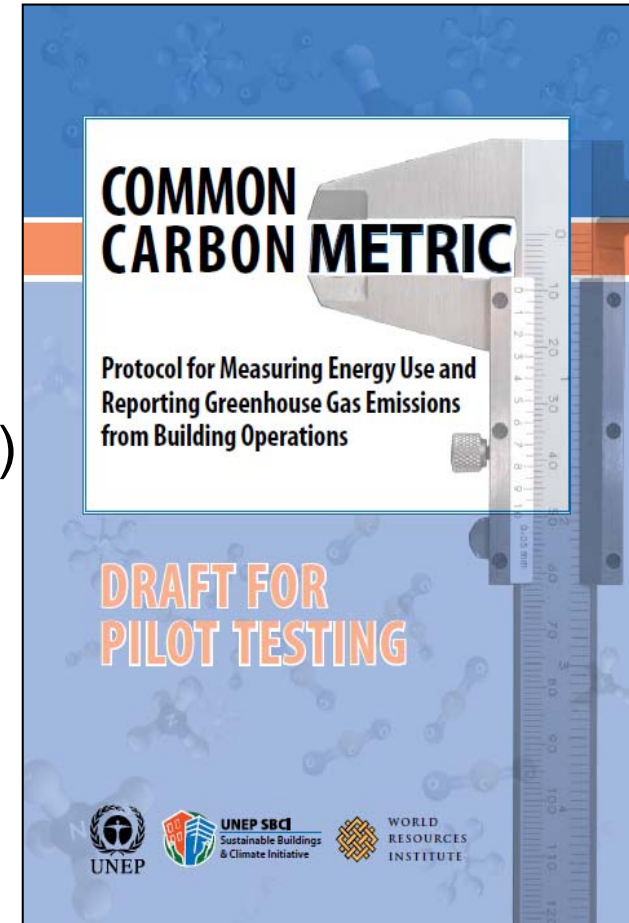
- Key Milestones & strategic targets
- Capacity Building, R&D, Demonstration
- Monitoring, Evaluation & Reporting

4. Fundraising

- **MRV Requirements**
- NAMA, World Bank, Dev. Banks, GEF
- Bi-lateral and Multi-lateral funds

The Common Carbon Metric (CCM)

- Measuring Energy Use & Reporting GHG Emissions from Building Operations
- CCM protocol and Excel based tool
- Developed by UNEP: SBCI
- Meets the requirements that reporting is measurable, reportable and verifiable (MRV)
- Phase 1 pilot: 2010-2011
- Phase 2 pilot: 2011-2012
- Energy: $\text{kWh/m}^2/\text{yr}$
 kWh/occupant/yr
- Emissions (equivalent (e)): $\text{kgCO}_2\text{e/m}^2/\text{yr}$
 $\text{kgCO}_2\text{e/occupant/yr}$



CCM methodology

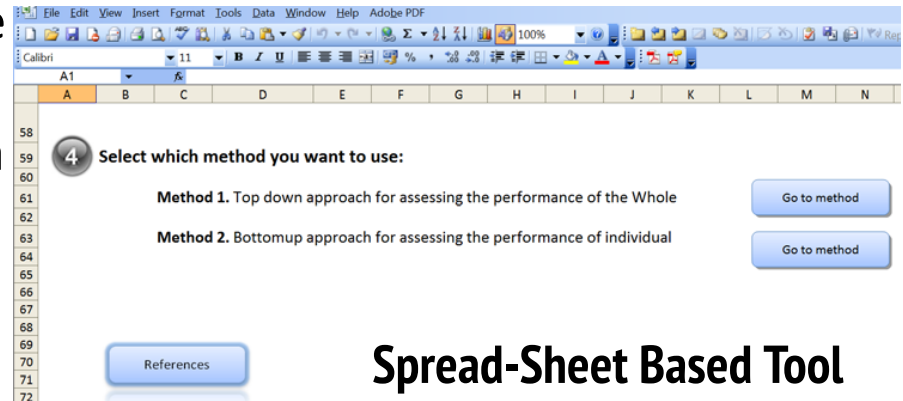


**Sustainable Buildings
and Climate Initiative**
Promoting Policies and Practices for Sustainability

- **Top-down approach:** Performance of the *whole* (regional, city or national level) is characterized at a coarse level using *estimated* data on fuel and electricity consumption.

- **Bottom-up approach:** Performance of individual case-study buildings is characterized at a fine level using *measured* data on fuel and electricity consumption.

- Ideally sample size will be statistically valid, enabling verification of the *whole*.



Spread-Sheet Based Tool



Data Required: Top-down approach

- **Floor Area** of the Whole (stock) (m²).
- **Total occupancy** of the whole (number of occupants, or number of residents where information on occupancy is limited).
- Information on the % of the Whole's **occupants** and **building area** attributable to different categories of building stocks (%).
- At a minimum for : residential and non-residential buildings. Information on the **total amount of electricity** consumed by the Whole and on the amounts of **different types of fuels** used
- Information on the % of the **Whole's electricity and fuel use** that is **attributable to different categories of building stocks** (%).
- **Custom emission factors** may optionally be provided in place of the **default emission factors for electricity and fuel use**.

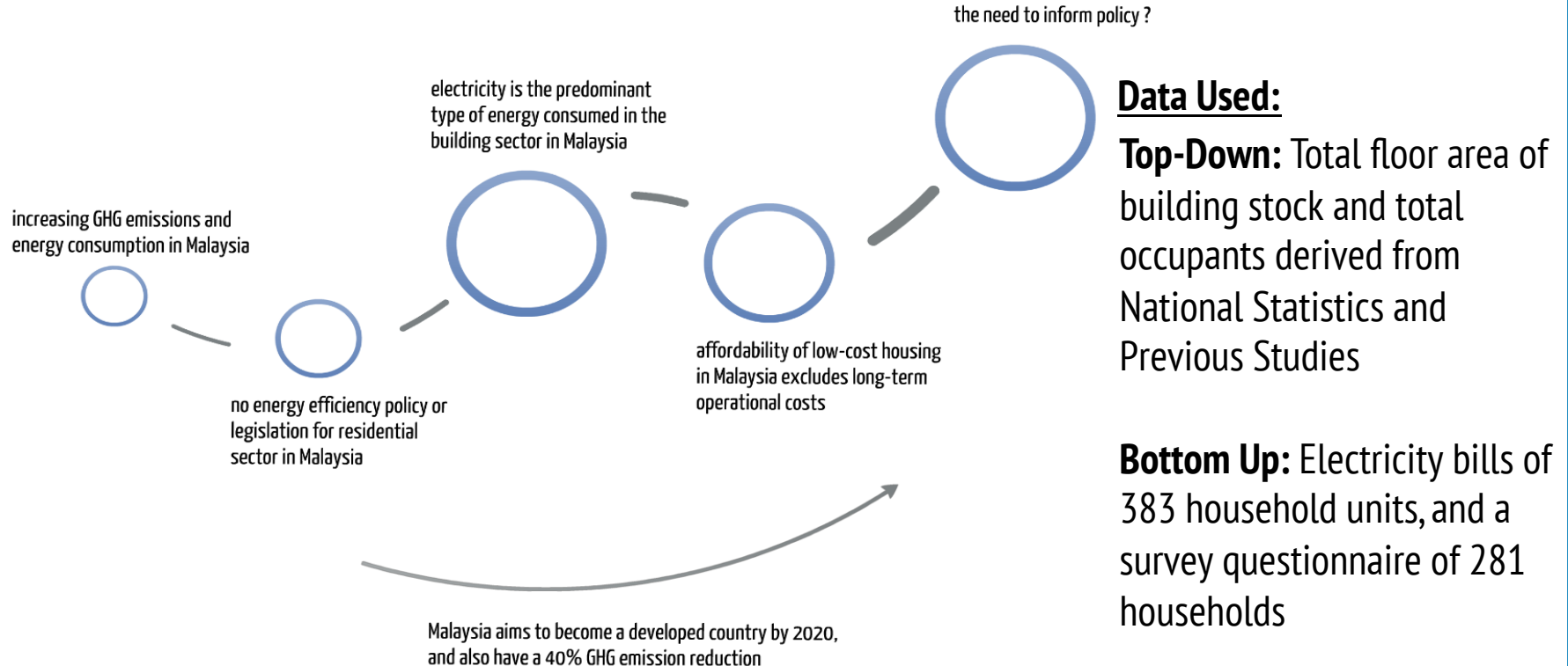
Data Required: Bottom up approach

- **Descriptive information**, including **building name**, **building category**, year of construction and year of last major retrofit, and address.
- **Occupancy** (number of occupants) and **area** (m2).
- Data on the **total amount** of purchased and **metered electricity** (in kWh).
- Data on the **total amount of *different* fuels** consumed (various measurement units).
- Custom emission factors may optionally be provided in place of the default emission factors for electricity and fuel use.
- Users may optionally report the **amount of purchased green power** or the **amount of renewable energy that has been generated on- site** and **returned to the grid**

Case Study: GHG Baseline Kuala Lumpur Affordable Housing

Electricity-Related GHG emissions , and its Affordability in Malaysian Low-Cost Housing

Case Study of Two Public PPR Low-Cost Housing Projects in Kuala Lumpur

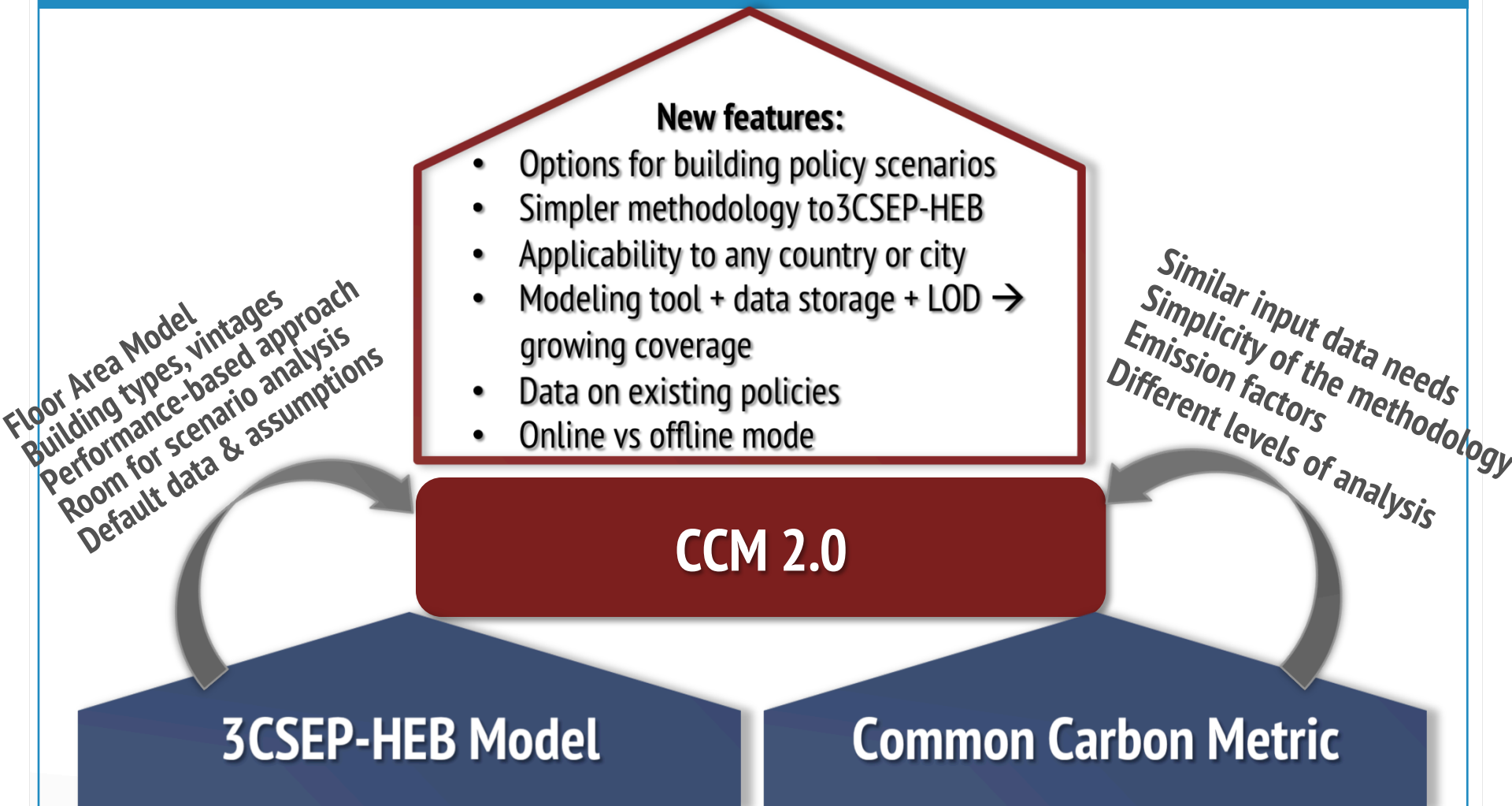


Source: Zaid, S. 2013 *Electricity related emissions and affordability in Malaysian low-cost housing*

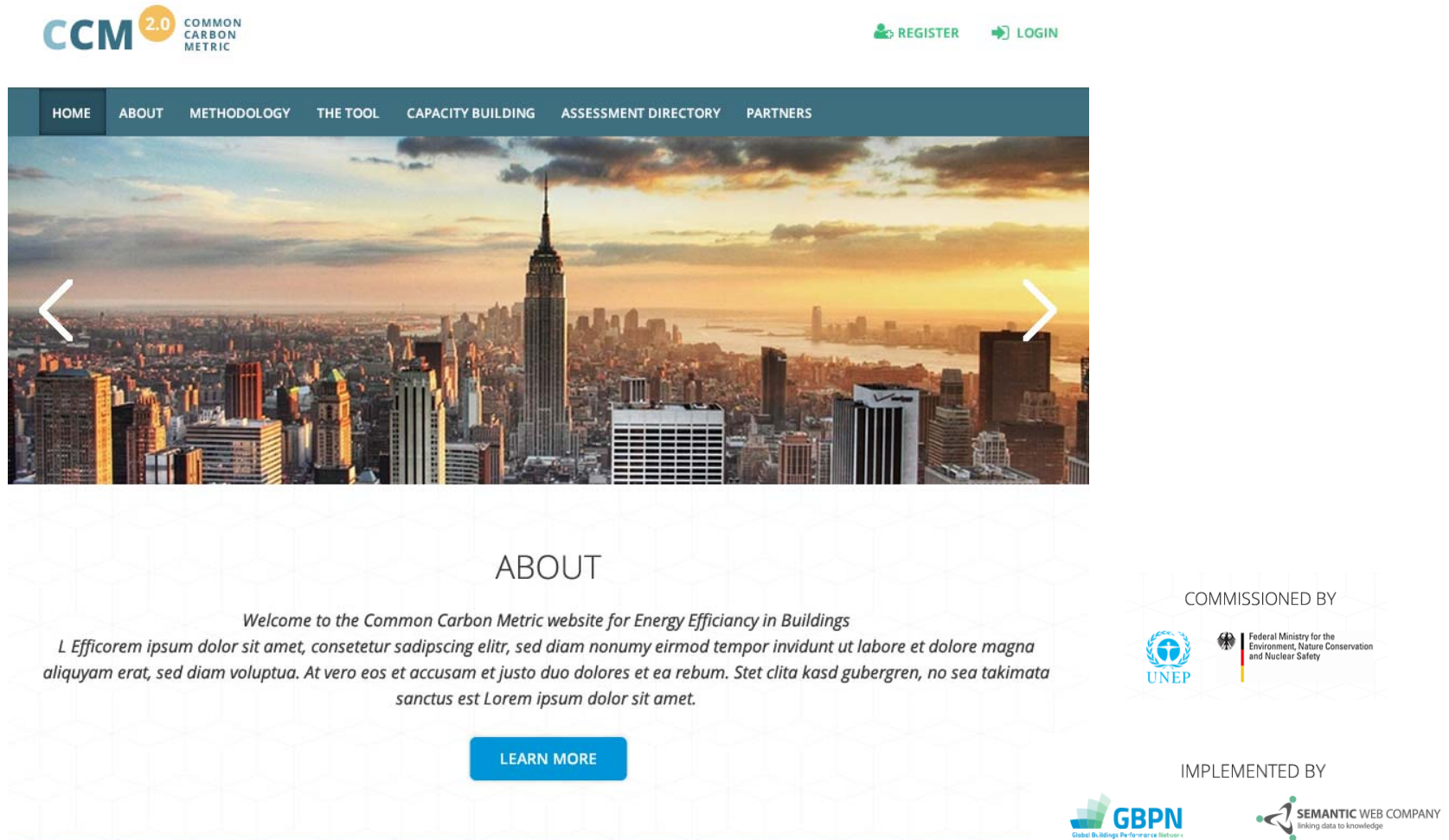
Results

Performance Metrics	Bottom-Up Approach				Top-Down Approach			
	Energy Consumption		GHG Emission		Energy Consumption		GHG Emission	
	kWh/m ² /yr	kWh/occupant/yr	kgCO ₂ e./m ² /yr	kgCO ₂ e./occupant/yr	kWh/m ² /yr	kWh/occupant/yr	kgCO ₂ e./m ² /yr	kgCO ₂ e./occupant/yr
PPR Beringin	44	531	27	328	85	1014	52	628
PPR Intan Baiduri	42	508	26	314				
Total	86	1,039	53	642				
Average	43	519	27	321				

CCM 2.0 Development



CCM 2.0: Coming Soon





1. Basic Information

1.1

Name of your Assessment ⁱ

Type a name

Please, select the approach you would like to use for your assessment ⁱ

- ☐ Top-down
- ☒ Bottom-up
- ☐ Hybrid

Would you like to conduct baseline or future-lines assessment? ⁱ

- ☐ Baseline
- ☒ Futureline(s)

Select a baseline

baseline one

CREATE A NEW BASELINE

Specify the start and end year of your futureline

2014 to 2020

Type the name of your futureline

futureline 1

Please, indicate the level you would like to make the assessment for ⁱ

- ☐ Region
- ☐ Country
- ☐ City
- ☒ District
- ☐ Portfolio of individual buildings

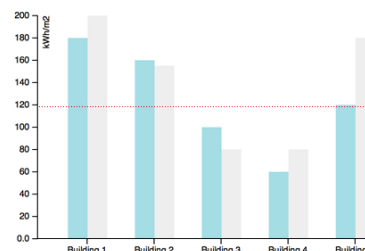
SAVE & NEXT

RESULT

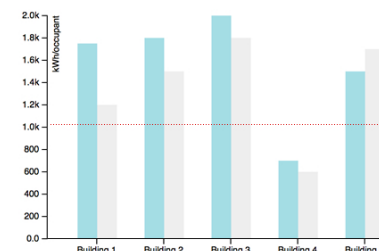
table view visual view

Energy use Average for Building type Average

Energy use (electricity + fuel) in kWh/m2

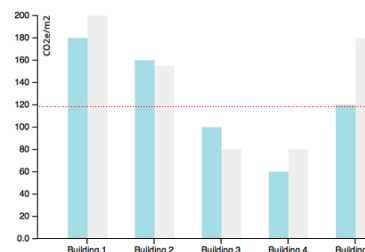


Energy use (electricity + fuel) in kWh/occupant

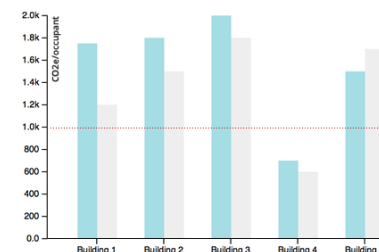


GHG emissions Average for Building type Average

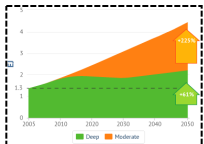
GHG emissions in CO2e/m2



GHG emissions in CO2e/occupant



CCM 2.0 Technical Elements



Scenarios (BAU, Mod, Deep) can be predefined or user-customised, opportunity to create a number of scenarios by varying certain assumptions



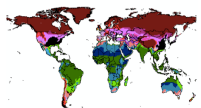
The tool can be applicable to **any region, at different scales**, new regions can be added, regional comparison can be enabled, default data/assumptions from 3CSEP-HEB model can be used



Estimations can be made for a certain year (**base year**) or a timeline can be set by the user up to 2050...



The tool will allow for calculating energy use and related CO2 emissions from **FIVE END USES**: SH, SC, WH, APP, LIGHTING



The tool can benefit from a comprehensive **climate classification** of 3CSEP-HEB model, a user can create their own (17 climate zones)



The tool can use the **building vintage** typology of 3CSEP-HEB model: new, existing, retrofit, advanced

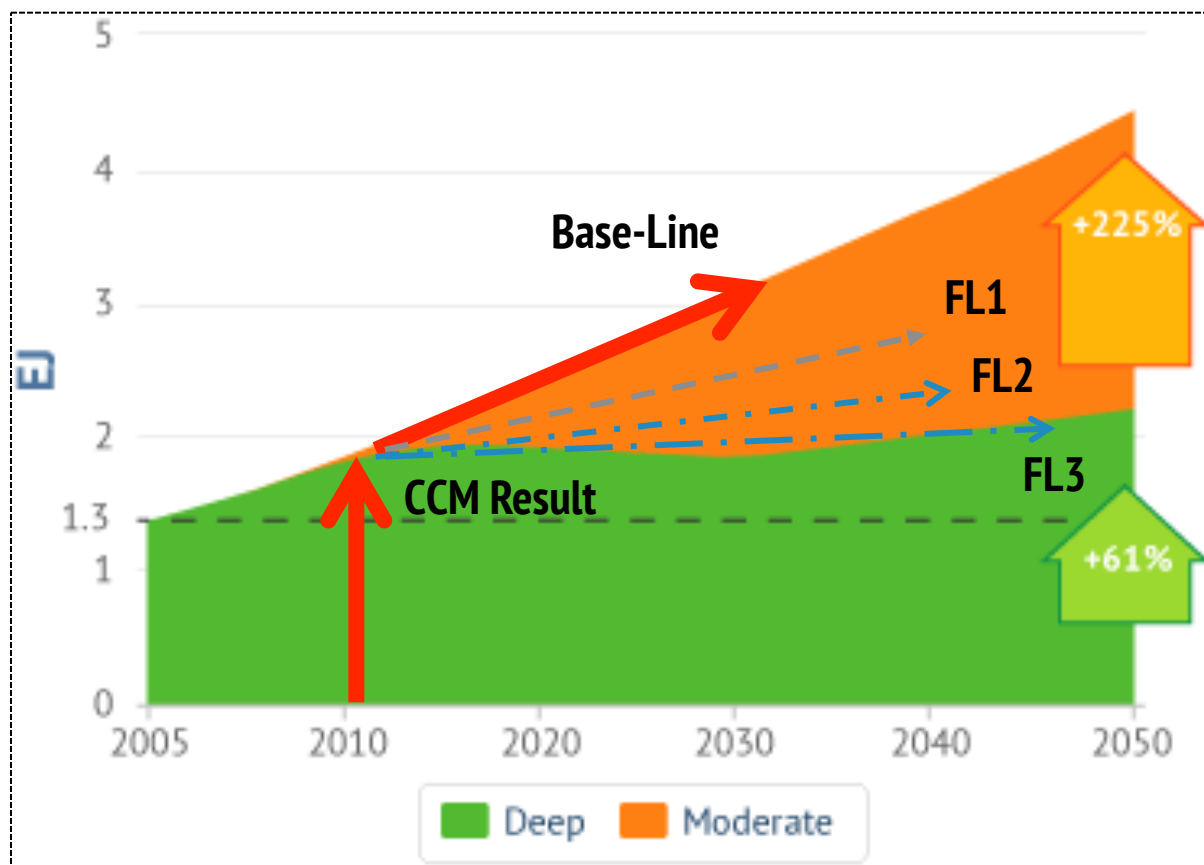


The tool can use the **building types** classification of 3CSEP-HEB model: SF, MF, Commercial (offices... etc), Urban, Rural

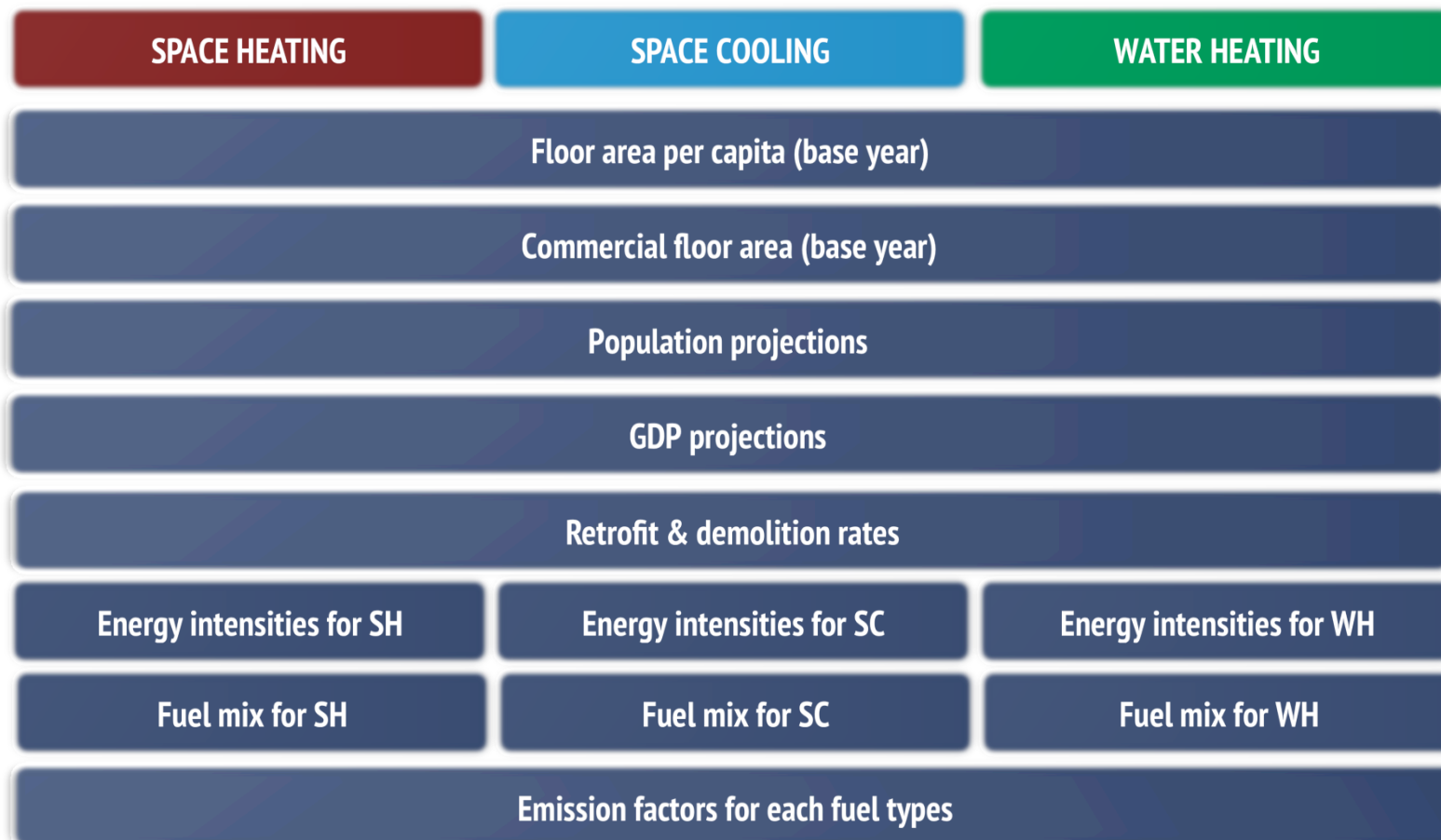
CCM 2.0 baseline & Scenario (futureline)

Baseline Development that is expected without initiating any additional action to reduce emissions. The baseline is also referred to as 'business as usual',

Futureline While the baseline aims to present the current state, the futureline aims to predict the future scenarios



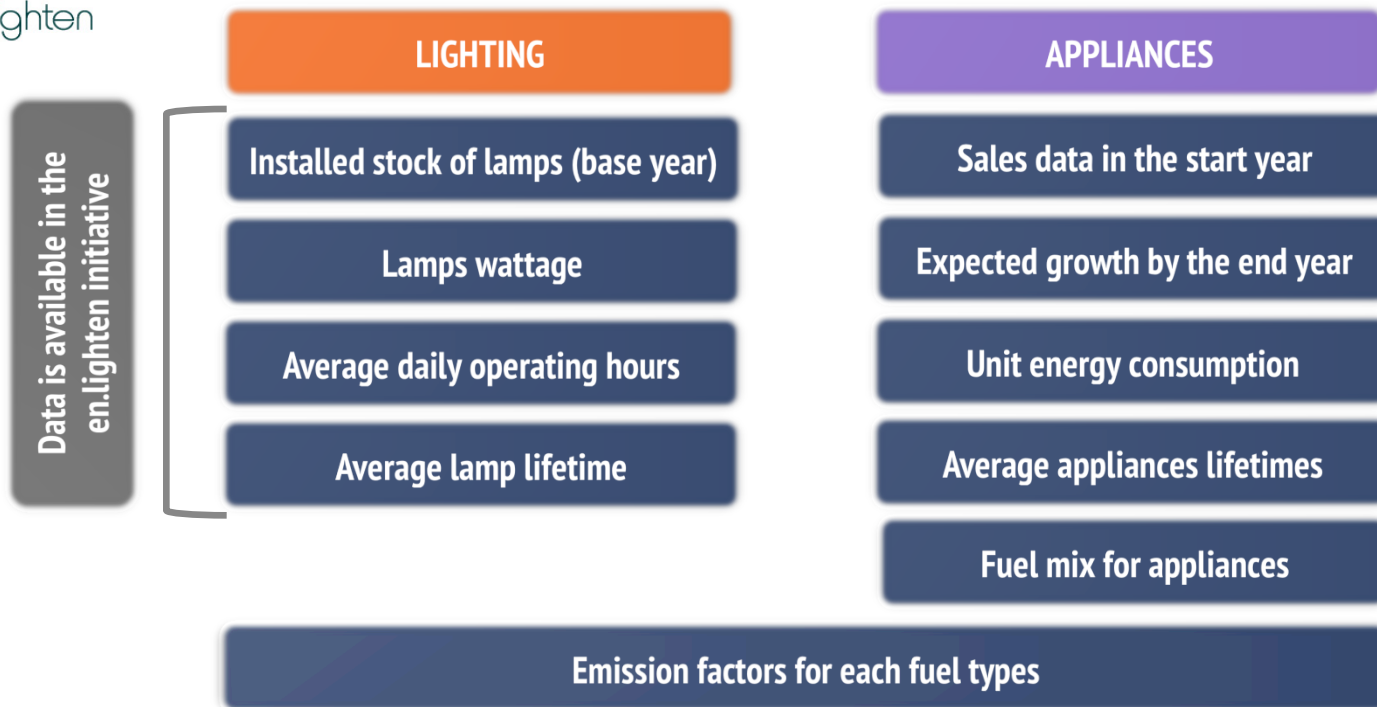
Data Inputs for Bottom-up approach: space heating, cooling & water heating



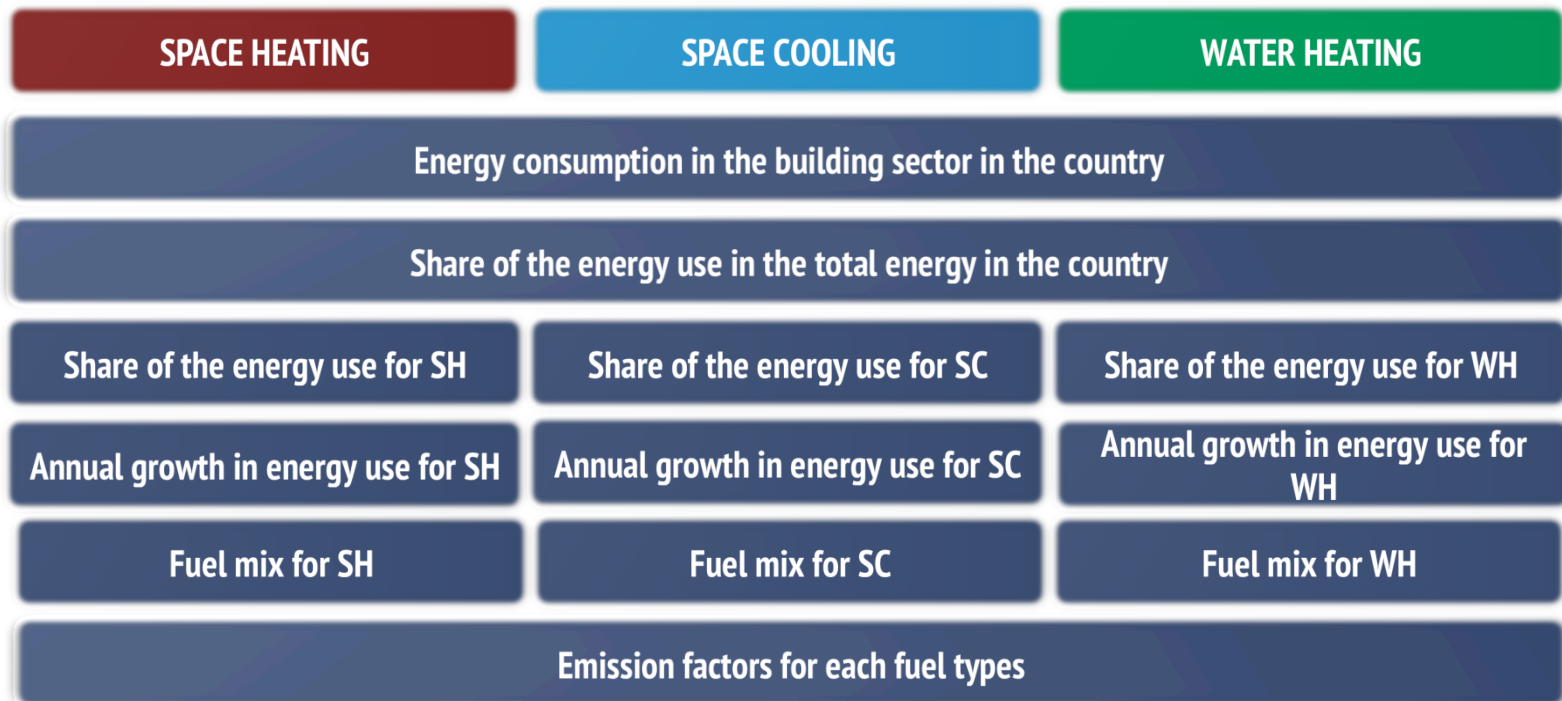
Inputs for Bottom-up lighting & appliances



en.lighten



Data Inputs for Top-down approach: space heating, cooling & water heating



Inputs for Top-down lighting & appliances



en.lighten

Data is available in the
en.lighten initiative

LIGHTING

Electricity use in buildings

Share of electricity for lighting

Share of electricity use for lighting
by building type

Lamps wattage

Average daily operating hours

Average lamp lifetime

Emission factors for electricity

APPLIANCES

Energy use in buildings

Share of energy use for appliances

Share of energy use for each
appliance category

Expected annual energy use growth
rate

Fuel mix for WH

Emission factors for each fuel types

Further application of CCM

- CCM has helped to establish a system of **MRV** indicators for the follow-up of policy implementation and reporting on building-related GHG emissions,
- **Nationally Appropriate Mitigation Actions (NAMAs)** To facilitate NAMAs, a globally consistent MRV methodology is essential to measure and track energy use and energy reductions from buildings.
- **CCM is able to support the establishment of baselines from the sector or sub-sector** (residential, commercial, etc.), thus allowing measurement over time of increased efficiency and GHG reductions from a particular building stock. (UNEP DTIE project - NAMAs for the Building Sector in Asia)
- **ISO standard** CCM has informed the development of an ISO standard on carbon metric of buildings (ISO/TC59/SC17).

Thank you!

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